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ABSTRACT

This document presents information about the apprenticeship training program of Alberta, Canada, in general and the steel detailer program in particular. The first part of the document discusses the following items: Alberta's apprenticeship and industry training system; the apprenticeship and industry training committee structure; local apprenticeship committees; provincial apprenticeship committees; the Alberta Apprenticeship and Industry Training Board; safety education; formal training; steel detailer certification; and Alberta's steel detailer competency profile. The second part of the document presents the course outlines for the first, second, and third levels of technical training. Selected topics covered in the three periods are as follows: the personal computer operating systems and standard office software; manual drafting basics and layouts; descriptive geometry and applied drafting mathematics; customer drawings and specifications; creating manual fabrication drawings; computer-aided design (CAD); surveying; welding inspection; shop floor activities; field activities; print room and data control activities; on-the-job drafting; statics; strengthening materials; creating fabrication drawings in CAD format; estimation practices; basic project scheduling; project monitoring; and technical writing. The course outlines detail course topics, intended outcomes, specific behavioral objectives, and times allotted for each topic covered. (MN)

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OCCUPATION COMPETENCY PROFILE

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Steel Detailer Program

Alberta
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Apprenticeship and Industry Training

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STEEL DETAILER

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Apprenticeship and Industry Training System

The Apprenticeship and Industry Training System provides for three different types of certification, compulsory certification in a designated trade, optional certification in a designated trade, and certification in a designated occupation. Certification in a designated occupation indicates an individual has met the standards for certification in an industry-developed program designated under the *Apprenticeship and Industry Training Act.*

The competencies required to meet the certification standard are developed by industry and approved by the Apprenticeship and Industry Training Board. Demonstration of competency may be achieved through on-the-job work experience or formal instruction received from an institution or another source or a combination of both.

There are three levels of steel detailer certification available. The level one takes approximately one year to complete. The level two requires an additional year with the level one as a prerequisite. The level three requires an additional two years with the level two as a prerequisite.

The apprenticeship and industry training system is driven by industry. The Alberta Apprenticeship and Industry Training Board relies on a network of industry committees representing the interests of over 50 trades and occupations. An Occupational Committee, consisting of representatives from the steel detailer occupation, develops standards for occupational certification.

The occupational committee develops the standards for certification as set out in this Occupation Competency Profile. A person training to be a steel detailer should register with the Alberta Chapter of the National Institute for Steel Detailing (NISD). A person who has completed the competency requirements and met industry standards for any level of the Steel Detailer training program to the satisfaction of the Alberta Chapter of NISD can apply for certification at any Client Services office of Alberta Learning, Apprenticeship and Industry Training. An NISD approved candidate will have to successfully pass an industry examination administered by Alberta Learning before obtaining certification.

A prior learning assessment is available for candidates who wish to demonstrate advance standing in the Steel Detailer Program. Prior Learning Assessment is available for all levels of certification. Candidates for prior learning assessment will have to meet the standards of the Alberta Chapter of NISD for the Steel Detailer Occupation and a pass a Qualification Examination administered by Alberta Learning.

Occupational Committee (OC)

The Board establishes an occupational committee for each designated occupation and based on occupational committee recommendation, appoints a Presiding Officer and members for terms up to three years. It is the responsibility of the occupational committee make recommendations to the Board on any matter concerning standards and requirements for certification in their occupation; consult with industry on issues affecting the occupation; represent interests of employers and employees across the industry and regions; communicate issues and recommendations to the Board; communicate with industry at large on matters before the occupational committee; promote the apprenticeship and industry training system in Alberta

Steel Detailer Occupation Committee Members

Jim Kanerva	Edmonton	Presiding Officer
Todd Collister	Edmonton	Employer
Terry Devine	Edmonton	Employer
Doug Cutler	Lethbridge	Employer
Robin Findlay	Lethbridge	Employer
Darrell Littlejohn	Edmonton	Employee
Brad Turner	Edmonton	Employee
Rob Schille	Edmonton	Employee
Troy Branch	Edmonton	Employee

The Alberta Apprenticeship and Industry Training Board (Board)

The 13 members of the Board appointed by the Minister are aware of the training and certification needs of trades and occupations. Many Board members have been members of the advisory network. The Board:

- responds to industry's needs
- sets training and certification standards in all trades
- approves the technical training to be delivered by training establishments
- encourages the development of alternate methods of technical training delivery
- makes recommendations to the Minister of Learning about the designation of trades and occupations
- . creates LACs, PACs, and appoints their members
- . advises the Minister on the labour market's need for skilled and trained workers

Safety Education

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance in industry training programs in Alberta. These responsibilities are shared and require the joint efforts of employers and employees. Controlling the variables and behaviors that may contribute to or cause an accident or injury can create safe learning experiences and environments. It is generally recognized that a safe attitude contributes to an accident free environment. Everyone will benefit as a result of a healthy safe attitude towards prevention of accidents. Individuals in this occupation may be exposed to more hazards than others in the work force and should be familiar and comply with the Occupational Health and Safety Act and Regulations respecting personal safety and the safety in the work place.

Legal and Administrative Aspects of Safety

Accident prevention and the provisions of safe working conditions are the responsibilities of an employer and employee.

Employer's Responsibilities:

The employer is responsible for:

- providing and maintaining safety equipment, protective devices and clothing.
- enforcement of safe working procedures.
- safeguards for machinery, equipment and tools.
- observance of all accident prevention regulations.
- training of employees in safe use and operation of equipment.

Employee's Responsibilities:

The employee is responsible for:

- working in accordance with the safety regulations pertaining to job environment.
- working in such a way as not to endanger themselves or fellow employees.
- safe use of all equipment and supplies provided by the employer

Formal Training

Training may be available through employers, public or private providers, or the Alberta Chapter of the NISD. The cost of training is the responsibility of the trainee or the employer or both. In order to obtain occupation certification a candidate must demonstrate competency in each of the standards established by industry. Contact the Alberta Chapter of NISD for more information.

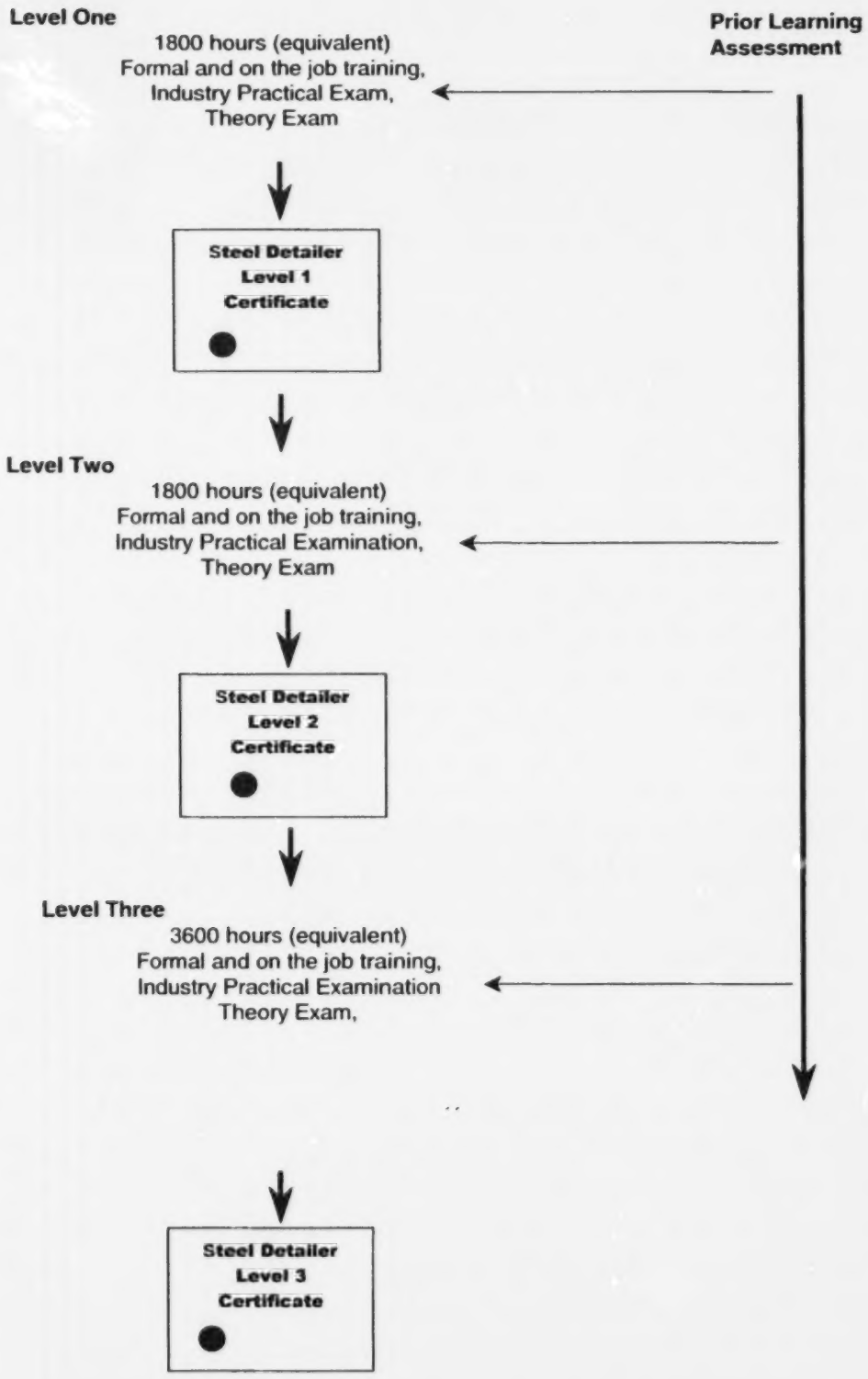
Procedures for Recommending Revisions to the Competency Profile

The Occupational Committee for the Steel Detailer Occupation has developed this competency profile and it was approved on June 27, 2003 under the authority of the Alberta Apprenticeship and Industry Training Board on a recommendation from the Occupational Committee. Valuable input is acknowledged from industry and the institutions. Any concerned citizen or group in the Province of Alberta may make recommendations for change by writing to:

Apprenticeship and Industry Training
Industry Programs and Standards
10th floor, Commerce Place
10155 - 102 Street
Edmonton, AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations received will be placed before regular meetings of the Occupational Committee.

Steel Detailer Route To Certification



Alberta Steel Detailer Competency Profile

Level 1 Formal Competency
(244 Hours)

SECTION ONE

INTRODUCTION TO PC OS AND STANDARD OFFICE SOFTWARE
10 Hours

- **A** — Computer Operating System
- **B** — Word Processing
- **C** — Spreadsheet
- **D** — Email / Scheduler / Contacts

SECTION TWO

INTRODUCTION TO MANUAL DRAFTING BASICS AND LAYOUT
40 Hours

- **A** — Graphic Language
- **B** — Drafting Standards
- **C** — Dimensioning
- **D** — Sketching and Shape Description
- **E** — Drawing Equipment

SECTION THREE

DESCRIPTIVE GEOMETRY AND APPLIED DRAFTING MATHEMATICS
40 Hours

- **A** — Introduction to Basic Concepts
- **B** — Fundamental Spatial Relationships
- **C** — Primary Auxiliary Views
- **D** — Successive Auxiliary Views
- **E** — Intersections and Developments
- **F** — Whole Numbers and Fractions
- **G** — Decimals
- **H** — Percentages, Ratios, Proportion
- **I** — Perimeters and Areas
- **J** — Volumes
- **K** — Conversions
- **L** — Imperial and Metric
- **M** — Calculator
- **N** — Trigonometry

SECTION FOUR

INTRODUCTION TO CUSTOMER DRAWINGS AND SPECIFICIFICATIONS
40 Hours

A	B	C
Reading Customer Drawings	Notes and Specifications	Bill of Materials
D	**E**	**F**
Structural Shapes and Sections	Detail Assembly and Sub Assembly Prints	Basic Connection Details

SECTION FIVE

INTRODUCTION TO CREATING MANUAL FABRICATION DRAWINGS
40 Hours

A	B	C
Bolting	Basic Joints for Welding	Welding Symbols
D	**E**	**F**
Notes	Bill of Material	Detail Assembly and Sub-assembly Prints

SECTION SIX

INTRODUCTION TO COMPUTER ASSISTED DRAFTING (INDUSTRY STANDARD SOFTWARE AND HARDWARE)
40 Hours

A	B	C
System Overview and Familiarization	Menus, Hierarchy, and Standard Commands	Drawing Set-up
D	**E**	**F**
Basic Drafting Exercises	Editing	Blocks, W-blocks, and their Usage
G	**H**	
Dimensioning	Title Blocks and Plotting	

SECTION SEVEN

INTRODUCTION TO SURVEYING
6 Hours

A	B	C
The Basics of Surveying	Tape Measurement	Leveling

SECTION EIGHT

CSA W 178.2 LEVEL III WELDING INSPECTOR COURSE
30 Hours

A	B	C
Welding Health and Safety	Basic Joints, Blueprint Reading and Preparation for Welding	Symbols for Welding
D	**E**	**F**
Welding Process and Equipment	Power Sources for Welding (optional)	Electrodes and Consumables (optional)
G	**H**	**I**
Distortion And Residual Stress	Basic Metallurgy and Material Specification	Basic Welding Metallurgy of Structural Steels

J	K	L
Basic Welding Metallurgy of Structural Steels	Weld Faults and Causes	Basic Inspection Technology

Level 1 Employer Based Competency
(1554 Hours)

SECTION ONE		A	
SHOP FLOOR EXPERIENCE 160 Hours	⇨	Fitter's Helper, Welder's Helper, or CNC/PC Helper	
SECTION TWO		A	
FIELD EXPERIENCE 160 Hours	⇨	Tasks Appropriate for a 1st Level Ironworker Apprentice	
SECTION THREE		A	
PRINT ROOM / DATA CONTROL EXPERIENCE 80-160 Hours	⇨	Duties of a Print Room / Data Control Clerk	
SECTION FOUR		A	
ON THE JOB DRAFTING EXPERIENCE 1020-1100 Hours	⇨	Use Knowledge in a Detailing Office	
SECTION FIVE		A	B
LEVEL 1 STANDARDIZED EXAMINATION	⇨	Theory Exam (Multiple Choice)	Practical Exam

Alberta Steel Detailer Competency Profile

Level 2 Formal Competency
(175 Hours)

SECTION ONE

INTRODUCTION TO STATICS
20 Hours

- **A** — Units
- **B** — Vector Analysis
- **C** — Equilibrium
- **D** — Properties of Areas

SECTION TWO

INTRODUCTION TO STRENGTHS OF MATERIALS
80 Hours

- **A** — Simple Stress
- **B** — Shear and Moment Diagrams
- **C** — Beam Design
- **D** — Column Design

SECTION THREE

CUSTOMERS DRAWING AND SPECIFICATIONS IN A CAD FORMAT
40 Hours

- **A** — Notes and Specifications
- **B** — Bill of Materials
- **C** — Structural Shapes and Sections
- **D** — Detail Assembly and Sub-assembly Prints
- **E** — Welding Symbols and Abbreviations
- **F** — Connection Details

SECTION FOUR

CREATING FABRICATION DRAWINGS IN A CAD FORMAT
40 Hours

- **A** — Joints for Welding
- **B** — Welding Symbols
- **C** — Notes
- **D** — Bill of Material
- **E** — Beam Detailing
- **F** — Column Detailing
- **G** — Bracing Detailing
- **H** — Detail Assembly and Sub-assembly Prints

SECTION FIVE

CSA W 178.2 LEVEL III WELDING INSPECTOR COURSE
30 Hours

A
Mechanical Testing of Welds (Optional)

B
Codes and Standards (Optional)

C
Basic Code of Quality (Optional)

D
Functions of The Inspector (Optional)

E
Techniques of Visual Inspection (Optional)

Level 2 Employer Based Competency (1625 Hours)

SECTION ONE

Shop Floor Experience
160 Hours

⇨ **A**
Quality Assurance or Quality Control Agent

SECTION TWO

FIELD EXPERIENCE
160 Hours

⇨ **A**
Tasks Appropriate for a QA/QC or Administrative Assistant

SECTION FOUR

ON THE JOB DRAFTING EXPERIENCE
1305 Hours

⇨ **A**
Use Knowledge in a Detailing Office

Alberta Steel Detailer Competency Profile

Level 3, Period 1 Formal Competency
(160 Hours)

SECTION ONE

PROJECT MANAGEMENT/LEADERSHIP

- A: Introduction to Bidding and Tendering Practices
- B: Introduction to Estimating Practices
- C: Introduction to Basic Project Scheduling
- D: Project Monitoring
- E: Introduction to Lien Acts and Torts

SECTION TWO

COMPUTER BASED STEEL DETAILING PROJECT RELATED ADMINISTRATION
40 Hours

- A: Basic Technical Writing Techniques
- B: Spreadsheet Applications
- C:
- D: Project Related Documentation

SECTION THREE

CUSTOMER DRAWING SPECIFICATIONS IN A CAD FORMAT (II)
40 Hours

- A: Notes and Specifications
- B: Reading Complex Drawings
- C: Understanding Other Structural Components
- D: Reading Other Trade Drawings
- E: Create Erection Drawings

SECTION FOUR

CREATING FABRICATION DRAWING IN A CAD FORMAT (II)
15 Hours

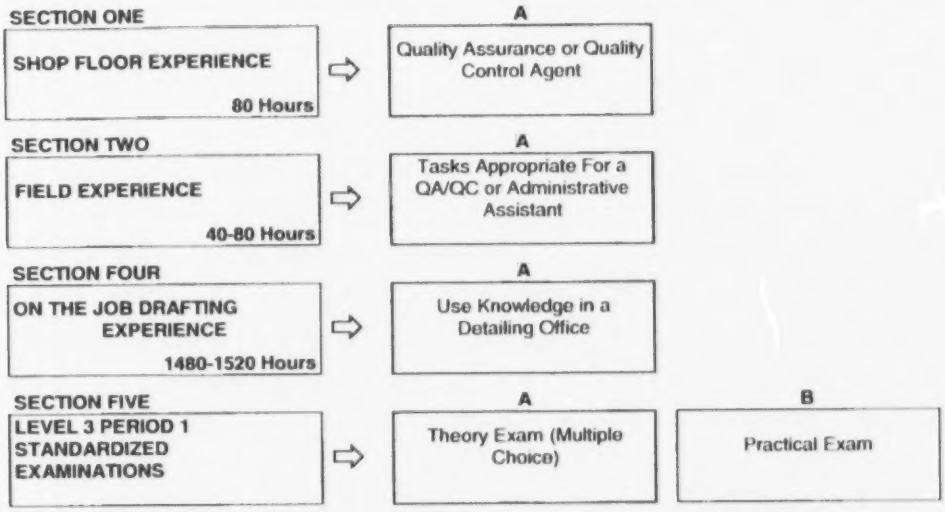
- A: Beam Detailing
- B: Column Detailing
- C: Bracing Detailing
- D: Miscellaneous Detailing

SECTION FIVE

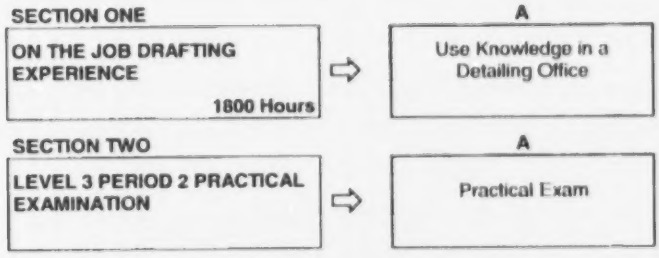
CSA W 178.2 LEVEL III WELDING INSPECTOR COURSE

- A: Surface Inspection (Optional)
- B: Radiographic Inspection (Optional)
- C: Ultrasonic Inspection (Optional)
- D: Structure and Properties Of Metals (Optional)
- E: Welding Metallurgy of Steels (Optional)

Level 3 Period 1 Employer Based Competency
(1640 Hours)



Level 3 Period 2 Employer Based Competency Completes
(1800 Hours)



LEVEL ONE COMPETENCY PROFILE
ALBERTA STEEL DETAILER CERTIFICATE PROGRAM

Note: Hours identified are the estimated time needed to learn these concepts and are not intended as rigid requirements.

SECTION ONE:..... INTRODUCTION TO PC OS AND STANDARD OFFICE SOFTWARE .....10 HOURS

Upon successful completion of this unit, the individual will be able to:

A. Computer Operating System

Competency: ***Operate computer.***

1. Perform correct start-up and shut-down procedures for the computer operating system (Current Business Standard OS).
2. Manage files and directories on PC and network.

B. Word Processing

Competency: ***Use a word processor.***

1. Operate word processor to create, save, edit and print documents.
2. Move and copy text.
3. Use formatting tools with text, paragraphs and documents.
4. Use of the 'find and replace' function to edit text.

C. Spreadsheet

Competency: ***Use a spreadsheet.***

1. Create, modify, print and format worksheets.
2. Work with formulas, functions and charts.
3. Use multiple worksheets.
4. Select program features to enhance worksheets.

D. Email / Scheduler / Contacts / Tools

Competency: ***Use email and personal information manager.***

1. Use the features and functions of scheduling software including: inbox, calendar, contacts, journal, notes and files.
2. Select and operate appropriate software for a particular use.

SECTION TWO: ..... INTRODUCTION TO MANUAL DRAFTING BASICS AND LAYOUTS .....40 HOURS

A. Graphic Language

Competency: ***Interpret drafting language.***

1. Interpret graphic language.

B. Drafting Standards

Competency: ***Describe drafting standards.***

1. Describe and compare A.S.A. and I.S.O. standards
2. Explain the general layout of a drawing and alphabet of lines.
3. Describe correct folding care and storage of drawings.

C. Dimensioning

Competency: ***Describe dimensioning.***

1. Describe dimensioning techniques, size description and scale.
2. Describe lines used for dimensioning, dimensional and extension line placement, arrowheads, and leaders, fractional and decimal dimensions, direction of dimensional arcs, angles, fillets and rounds, surface finish marks and symbols.
3. Explain tolerances of angles and shop processes.

D. Sketching and Shape Description

Competency: ***Make manual sketches.***

1. Perform freehand sketch of simple parts like bolts, rectangular or square shapes, and round or oblong shapes.
2. Use various line techniques to sketch perspective and orthographic multi-views.

E. Drawing Equipment

Competency: ***Use drafting tools and basic techniques.***

1. Use drawing equipment including pencils, t-squares, scales, compass, protractor, set squares, irregular curves, and eraser shields.
2. Use fabrication drawing and layout equipment including squares, chalk, layout blue, silver streak, felt markers, dividers, trammels, rules, tapes, soapstone, wrap-arounds, center and prick punches.
3. Define and explain the terms and symbols associated with drafting and layout.
4. Explain the layout of the following geometric constructions: parallel lines using the tangent method, perpendicular lines from points on and of the line, transfer angles, bisect lines, arcs and angles, construct various polygons, divide a line into a given number of parts using the draftsman and geometric method, find the center of a circle, construct a circle through three given points and construct radii for right, obtuse and acute angles.

SECTION THREE:..... DESCRIPTIVE GEOMETRY AND APPLIED DRAFTING MATHEMATICS .....40 HOURS

A. Introduction to Basic Concepts

Competency: ***Apply principles of geometry.***

1. Explain planes of projection.

B. Fundamental Spatial Relationships

Competency: ***Describe concepts of drafting geometry.***

1. Describe objects such as geometric shapes, points on lines, visibility of lines and planes, and parallelism of lines.

C. Primary Auxiliary Views

Competency: ***Represent three-dimensional objects in two dimensions.***

1. Explain perpendicular of lines, edge view of planes.
2. Describe true length of analytic geometry.
3. Identify intersection of planes, slope of a line and strike and dip.

D. Successive Auxiliary Views

Competency: ***Apply geometry and drafting mathematics.***

1. Identify secondary auxiliary.
2. Describe the true size of an oblique plane.
3. Identify the shortest distance from a point to a line, the shortest distance between two skewed lines, and the shortest grade distance between two skewed lines.
4. Identify the angular distance to a line.

E. Intersections and Developments

Competency: ***Develop alternate views.***

1. Describe intersections and developments.

F. Whole Numbers and Fractions

Competency: ***Perform calculations with whole numbers and fractions.***

1. Select correct operation to solve addition, subtraction, multiplication and division problems using whole numbers and fractions.
2. Perform computation to solve addition, subtraction, multiplication and division problems using whole numbers and fractions.

G. Decimals

Competency: ***Perform calculations with decimals.***

1. Select correct operation to solve addition, subtraction, multiplication and division problems using decimals.
2. Perform computation to solve addition, subtraction, multiplication and division problems using decimals.

H. Percentages, Ratios, Proportion

Competency: ***Perform calculations using ratio and proportion.***

1. Calculate percentage and ratio using whole numbers, decimals, and fractions.
2. Solve problems involving direct proportion, and calculate scale ratio on drawings.
3. Calculate scale ratio on drawings.

I. Perimeter and Area

Competency: ***Calculate perimeters and areas.***

1. Calculate the perimeter of squares, rectangles, circles, parallelograms and irregular shapes.
2. Calculate the area of squares, rectangles, circles, parallelograms and irregular shapes.

J. Volume

Competency: ***Calculate volumes.***

1. Calculate the volume of square, rectangular, and cylindrical containers.

K. Conversions

Competency: ***Convert imperial linear measures.***

1. Convert feet to inches, and vice versa, square inches to square feet and vice versa.

L. Imperial and Metric

Competency: ***Convert imperial and metric measurements.***

1. Convert area, volume, linear measurement and weight force, mass, measurements between imperial and metric systems.

M. Calculator

Competency: ***Use electronic calculators.***

1. Use a calculator for arithmetical, mathematical operations and conversions.

N. Trigonometry

Competency: ***Apply trigonometry.***

1. Perform calculations using sin, cos, tan, sine law and cosine law.
2. Explain acute angle and half angle formulas.
3. Explain right angle solutions and the Pythagorean Theory.

SECTION FOUR: .....INTRODUCTION TO CUSTOMER DRAWINGS AND SPECIFICATIONS.....40 HOURS

A. Reading Customer Drawings

Competency: ***Interpret the basics of engineering and architectural drawings.***

1. Explain the relationship between architecture drawings and the engineer's structural drawings.
2. Describe standard drawing symbols, construction methods, architectural sections, referencing, and sections and elevations.

B. Notes and Specifications

Competency: ***Obtain requirements from notes and specifications.***

1. Identify grades of steel required.
2. Decipher which particular notes apply.
3. Select paint preparations, required bolt grades, connection requirements and loads.
4. Select required reference drawings.

C. Bill of Materials

Competency: ***Describe bill of materials.***

1. Describe what is required and section sizes shown.
2. Explain abbreviations of steel sections.

D. Structural Shapes and Sections

Competency: ***Describe structural steel type and properties.***

1. Identify steel shapes.
2. Explain the properties and terminology of steel shapes.

E. Detail Assembly and Sub-assembly Prints

Competency: ***Select structural steel components.***

1. Read customer drawings and select required steel for assembly.
2. Select components that are sub-assembled to steel.

F. Basic Connection Details

Competency: ***Determine connection requirements.***

1. Read engineering details of customer drawings or notes.
2. Identify customer standards for connection details.

SECTION FIVE:.....INTRODUCTION TO CREATING MANUAL FABRICATION DRAWINGS.....40 HOURS

A. Bolting

Competency: ***Describe structural bolting systems.***

1. Describe the types of structural bolts, bolt connections, holes and slots.
2. Explain methods of installation.

B. Basic Joints for Welding

Competency: ***Describe basics of welding structural steel.***

1. Describe the basic joints for welding: end plate, double angle, gusset plates, stiffeners, moment connections, assemblies, handrail, girts, and prepared connections.

C. Welding Symbols.....4 Hours

Competency: ***Select appropriate welding symbols.***

1. Identify welding symbols.
2. Select and apply correct weld symbols to fabrication drawings.
3. Describe welds and weld strengths.

D. Notes

Competency: ***Enter notes for fabrication drawings.***

1. Identify required notes and ensure they are shown on fabrication drawings.
2. Select proper terminology for use in notes.

E. Bill of Material

Competency: ***Create bill of materials used for fabrication.***

1. Enter the material required to fabricate steel properly.
2. Ensure the correct length and grade of steel are entered.

F. Detail Assembly and Sub-assembly Prints

Competency: ***Create fabrication drawing.***

1. Show proper views, piece marks, and dimensions.

SECTION SIX:..... INTRODUCTION TO AUTOCAD 14 (OR EQUIVALENT).....40 HOURS

A. System Overview and Familiarization

Competency: ***Locate CAD commands, menus and files.***

1. Locate program windows, pull down menus, tool bars, and command line etc,.
2. Explain file management; opening, naming and saving files.
3. Explain how the help system is used.

B. Menus, Hierarchy and Standard Commands

Competency: ***Issue CAD commands.***

1. Operate pull down menus, toolbars, command line, keyboard commands, function keys and data input.

C. Drawing Set-up

Competency: ***Set up new CAD drawing.***

1. Explain planning and layout using AutoCAD (or equivalent) software.
2. Explain how to set units, set limits, use grids and snaps, use layers and line types.
3. Create templates.

D. Basic Drafting Exercise

Competency: ***Use CAD for basic drafting operations.***

1. Operate the cursor and auto snap.
2. Navigate within your drawing.
3. Operate layer manager.
4. Select appropriate tool to draw simple shapes i.e. arcs, circles, ellipses or input text.

E. Editing

Competency: ***Modify elements of a CAD drawing.***

1. Describe the use of the properties tool.
2. Explain how to modify toolbars.
3. Perform appropriate actions to customize toolbars.
4. Explain bonus toolbars.
5. Describe attributes.

F. **Blocks, W-blocks, And Their Usage**

Competency: ***Describe CAD blocks.***

1. Explain the concept of blocks.
2. Describe writing blocks, block management and libraries.

G. **Dimensioning**

Competency: ***Dimension CAD drawings.***

1. Describe dimensioning styles and families.
2. List the variables for geometry, format and annotation.
3. Illustrate dimscale and dimension text.
4. Operate dimensioning toolbar.

H. **Titleblocks And Plotting**

Competency: ***Prepare a CAD drawing for printing.***

1. Perform appropriate actions to create titleblocks.
2. Select paper size and scale.
3. Select print/plot configurations.

SECTION SEVEN:.....INTRODUCTION TO SURVEYING.....6 HOURS

A. **The Basics Of Surveying**

Competency: ***Describe basics of surveying.***

1. Explain why a detailer needs to know surveying.
2. Describe the definitions, types and classes of surveying.
3. Describe the methods and equipment used for surveying.
4. Explain survey references, units of measurement, accuracy and precision, field notes and management.

B. **Tape Measurement**

Competency: ***Describe survey measurement methods.***

1. Describe the methods and types of linear measurement.
2. Describe the equipment and accessories used in surveying.
3. Illustrate the use of practical and field notes.

C. **Leveling**

Competency: ***Demonstrate understanding of leveling.***

1. Define leveling and explain leveling theory.

2. Describe leveling procedure.
3. Explain leveling operations and definitions.
4. Use of practical and field notes.

SECTION EIGHT:..... CSA W 178.2 LEVEL III WELDING INSPECTOR..... 30 HOURS
PREPARATION COURSE

A. This is the preparation course for becoming a CSA W 178.2 Level III welding Inspector. The students will have the three Steel Detailer level periods to complete all 21 modules, if desired, but Module 1-4 and 7-11 are the only mandatory modules. For Level 1, the following modules are to be completed.

Competency: ***Describe inspection of structural steel welds.***

1. Module 1: Welding Health and Safety
2. Module 2: Basic Joints, Blueprint Reading and Preparation For Welding
3. Module 3: Symbols for Welding
4. Module 4: Welding Process and Equipment
5. Module 5: Power Sources for Welding (Optional)
6. Module 6: Electrodes and Consumables (Optional)
7. Module 7: Distortion and Residual Stress
8. Module 8: Basic Metallurgy And Material Specification
9. Module 9: Basic Welding Metallurgy Of Structural Steels
10. Module 10: Weld Faults And Causes
11. Module 11: Basic Inspection Technology.

Note: The content covered in these Modules may be completed by an alternative method, if approved by the Occupational Committee.

If the student completes Modules 5 and/ or 6, add 3.5 hours/ Optional Module completed onto the 280 Level One classroom component hours. In addition, deduct 3.5 hours /Optional Module completed from P1.4 on-the-job drafting experience.

ALBERTA STEEL DETAILER CERTIFICATE LEVEL 1 PRACTICAL

Note: Hours listed are the estimated time needed to teach these concepts. They are not intended as rigid guidelines.

SECTION ONE: ..... SHOP FLOOR EXPERIENCE ..... 160 HOURS

Competency: ***Demonstrate familiarity with fabrication procedures.***

1. Assist Fitter, Welder, or CNC/PC Operator in steel fabrication.

SECTION TWO: ..... FIELD EXPERIENCE ..... 160 HOURS

Competency: ***Describe basics of erection.***

1. Work experience at a construction site that provides the opportunity to observe and interact with Ironworkers erecting structural steel.

Note: The student's employer may choose the number of field hours (Sections one and two above) that the student will complete, with a minimum of 80 and maximum of 160. These hours do not have to be completed all at once, and the student's employer may take into account the type of fieldwork that is available such as commercial versus industrial when choosing the number of hours.

SECTION THREE: ..... PRINT ROOM / DATA CONTROL EXPERIENCE ..... 80-160 HOURS

Competency: ***Demonstrate familiarity with print and data control procedures.***

1. Perform duties of a Print room / Data Control clerk.
2. State clearly the functions of the Print room / Data control Area.

SECTION FOUR: ..... ON THE JOB DRAFTING EXPERIENCE ..... 1020-1100 HOURS

Competency: ***Perform Employer assigned job tasks appropriate to experience and ability to learn.***

(Examples)

1. Orient self to a drawing office.
2. Perform general office tasks: send faxes, transmittals, use telephone, email, couriers and post.
3. Use copiers, make copies, load paper, toner, and cartridges.
4. Do basic copier repair & maintenance fix jams, etc,.
5. Use telephone systems, attend meetings, and develop professional communication and interaction skills.
6. Read drawings and specifications.
7. Do lettering.
8. Draw simple beams, columns and bracings.
9. Draw simple stairs and handrails.

LEVEL TWO COMPETENCY PROFILE
ALBERTA STEEL DETAILER CERTIFICATE PROGRAM

Note: Hours listed are the estimated time needed to teach these concepts. They are not intended as rigid guidelines.

SECTION ONE: ..... Introduction To Statics ..... 60 HOURS

A. Units

Competency: ***Convert Metric and Imperial Measurement.***

1. Select and use Imperial and Metric units for measurement.
2. Perform conversions between Imperial and Metric units.
3. Apply conversion to drawings and specifications.
4. Use tables and industry references for converting structural steel rolled stock from metric to imperial and vice versa.

B. Vector Analysis

Competency: ***Perform calculations using vectors.***

1. Define a vector and scalar.
2. Describe vector systems: coplanar and concurrent.
3. Perform calculations using addition and subtraction of vectors: resultant, equilibrium and components.
4. Explain vector couples and moments.

C. Equilibrium

Competency: ***Apply concept of equilibrium.***

1. List the equations of equilibrium.
2. Describe structural types: determinate and indeterminate.
3. Describe supports.
4. Describe loads.
5. Create free body diagrams.
6. Describe simple structures: graphical and mathematical solutions.
7. Describe frames.

D. Properties of Areas

Competency: ***Describe centroids (center of mass).***

1. Describe plane shapes (steel shapes).
2. Describe solid shapes.
3. Describe work points (eccentricity).
4. Determine simple moment of inertia

SECTION TWO: ..... INTRODUCTION TO STRENGTHS OF MATERIALS.....20 HOURS

A. Simple Stress

Competency: ***Describe effects of stress on connections.***

1. Describe tension, compression, shear and connections.
2. Illustrate design examples.
3. Describe properties of materials

B. Shear and Moment Diagrams

Competency: ***Explain shear and moment diagrams.***

1. Create simple shear and moment diagram

C. Beam Design

Competency: ***Describe fundamentals of beam design.***

1. Describe flexural stress.
2. Describe shear stress.
3. Describe deflection.
4. Describe torsion.

D. Column Design

Competency: ***Describe considerations for column design.***

1. Explain slenderness ratio.
2. Explain end connections.
3. Explain column classification.

SECTION THREE:.....CUSTOMER DRAWING AND SPECIFICATIONS IN A CAD FORMAT.....40 HOURS

A. Notes and Specifications

Competency: ***Work with customer drawings and specifications in a CAD format.***

1. Select required grade of steel.
2. Decipher applicable notes.
3. Determine required bolt grades, connection requirements, and loads.
4. Select required reference drawings.
5. Explain the Alberta building code and S16.1 and how these codes relate to Notes and Specifications.

B. Bill of Materials

Competency: ***Compile bill of materials using industry standard terminology and abbreviations.***

1. State what is required and the section sizes shown.
2. Explain abbreviations of steel sections.

C. Structural Shapes and Sections

Competency: ***Describe properties of structural steel shapes.***

1. Define steel shapes and their properties. Review CSA G40.21 and the American equivalent.

D. Detail Assembly and Sub assembly Prints

Competency: ***Derive steel components and subassemblies from customer drawings.***

1. Show ability to read customer drawings.
2. Locate steel to be assembled.
3. Identify components that are sub-assembled to steel.

E. Welding Symbols And Abbreviations

Competency: ***Read and interpret welding symbols on engineer's drawings.***

1. Identify weld and weld sizes shown on customer drawings.
2. Recognise symbols for field welds and shop welds.
3. Explain what welding symbols represent. Review ANSI/AWS A2.4-98, ANSI/AWS A3.0-94.

F. Connection Details

Competency: ***Determine engineering standards from drawings and notes***

1. Read engineering details of customer drawings or the notes referred to in drawings.
2. Determine customer standards for connection details.
3. Review s16.1c13, 21,22,23,28.5.1, yellow and blue pages of CISC handbook, W59-89.

SECTION FOUR: ..... CREATING FABRICATION DRAWINGS IN A CAD FORMAT..... 40 HOURS

A. Joints for Welding

Competency: ***Enter weld joints in basic steel fabrication drawings.***

1. Define end plate, double angle, gusset plates, stiffeners, moment connections, assemblies, handrail, girts, and prepared connections.

B. Welding Symbols

Competency: ***Choose and enter and weld symbols on drawings.***

1. Determine correct welds.
2. Apply proper symbols to fabrication drawings.
3. Describe welds, welding symbols, and weld strengths.

C. Notes

Competency: ***Create notes.***

1. Show proper notes on fabrication drawings.
2. Use correct terminology in notes.

D. Bill Of Material

Competency: ***Create bill of materials.***

1. State amount required material accurately.
2. Identify correct length and grade of steel.

E. Beam Detailing

Competency: ***Create simple beam details.***

1. Explain the detailing of simple beams, girders, girts, and purlins.

F. Column Detailing

Competency: ***Create columns and column details.***

1. Describe simple columns, both HSS and WF.
2. Describe baseplates, anchor bolts/holes, tie joist clips, and cap plates.

G. Bracing Detailing

Competency: ***Create bracing and bracing component details.***

1. Describe horizontal and vertical bracing using various shapes, gussets, and field plates.

H. Detail Assembly And Sub-assembly Prints

Competency: ***Create assembly and Sub-assembly details.***

1. Show proper views, piece marks, dimensions, sections, and welds are shown.

SECTION FIVE:..... CSA W 178.2 LEVEL III WELDING INSPECTOR..... PREPARATION COURSE

This is the preparation course for becoming a CSA W 178.2 Level III welding Inspector. The students will have three levels to complete all 21 modules, if desired, but Module 1-4 and 7-11 are the only mandatory modules. For Level 2, the following modules may be completed, but are optional to this program.

Competency: ***Describe weld-testing procedure for structural steel and structural components.***

1. Module 12: Mechanical Testing Of Welds (Optional)
2. Module 13: Codes And Standards (Optional)
3. Module 14: Basic Concepts Of Quality (Optional)
4. Module 15: Functions Of The Inspector (Optional)
5. Module 16: Techniques Of Visual Inspection (Optional)

ALBERTA STEEL DETAILER CERTIFICATE
LEVEL 2 PRACTICAL COMPETENCY

Note: Hours listed are the estimated time needed to teach these concepts. They are not intended as rigid guidelines.

SECTION ONE:.....SHOP FLOOR EXPERIENCE..... 160 HOURS

Competency: ***Perform quality assurance process and procedure.***

1. Perform tasks appropriate for a Quality Assurance or Quality Control Agent. This should be is an introductory level fitting and/or welding inspection. Student should gain tangible insight into the problems faced on the shop floor when working with drawings.

SECTION TWO: ..... FIELD EXPERIENCE ..... 160 HOURS

Competency: ***Apply quality assurance concepts to the creation of detail drawings.***

1. Perform tasks appropriate for a QA/QC or administrative assistant to allow the student tangible insight into the problems faced in the field when working with drawings.

Note: The student's employer may choose the number of field hours that the student will complete, with a minimum of 80 and maximum of 160. These hours do not have to be completed all at once, and the student's employer may take into account the type of fieldwork that is available such as commercial versus industrial when choosing the number of hours.

SECTION THREE:.....ON THE JOB DRAFTING EXPERIENCE..... 1305 HOURS

Competency: ***Apply learned steel detail knowledge to complete employer assigned steel detail tasks.***

(Examples)

Apply the knowledge gained from Level 1 and Level 2 curriculum in a detailing office. Suggested activities are:

1. Read drawings and specifications.
2. Use lettering.
3. Draw sloping beams, columns.
4. Complex bracings offsets, skews.
5. Draw stairs and handrails.
6. Draw double crank stairs.
7. Draw anchor bolts and wrap plates.
8. Work with junior staff teaching skills learned.
9. Apply advanced office skills, professional deportment.
10. Consult with customer, engineer on RFIs, transmittals, etc,.

LEVEL THREE, PERIOD ONE COMPETENCY PROFILE
ALBERTA STEEL DETAILER CERTIFICATE PROGRAM

Note: Hours listed are the estimated time needed to teach these concepts. They are not intended as rigid guidelines.

SECTION ONE:.....INTRODUCTION TO STEEL PROJECT AND ESTIMATING.....40 HOURS
RELATED MANAGEMENT TECHNIQUES

A. Introduction To Bidding And Tendering Practices

Competency: ***Describe common types of contracts for steel detailing.***

1. Explain the most common types of contracts: lump sum, unit price, cost-plus, and cost plus with an upset.

B. Introduction to Estimating Practices

Competency: ***Identify and describe cost and profit categories.***

1. Describe quantity surveying, and pricing, applying direct and indirect costs, overhead, profit, and work/time schedules.

C. Introduction to Basic Project Scheduling

Competency: ***Create project schedules.***

1. Identify available resources.
2. Compare available resources with master schedule.
3. Create a critical path schedule.
4. Coordinate with customer.
5. Monitor and modify when necessary.

D. Project Monitoring

Competency: ***Describe how projects are monitored.***

1. Explain cost accounting and procurement.
2. Describe information and reporting systems.

E. Introduction To Lien Acts And Torts

Competency: ***Describe legal aspects of contracting.***

1. Explain liens and torts.

SECTION TWO: ..... COMPUTER BASED STEEL DETAILING ..... 40 HOURS
PROJECT RELATED ADMINISTRATION

A. Technical Writing Techniques

Competency: ***Create technical documents and notes.***

1. Write fabrication and erection notes.
2. Create transmittals ABMs, RFIs, point to point bolt lists, etc,.
3. Perform revisions of technical communication.
4. Respond to technical questions.
5. Write Change Orders.

C. Spreadsheet Applications

Competency: ***Design spreadsheet solutions to problems in steel detailing.***

1. Apply advanced spreadsheet functions.

D. Project-related Documentation

Competency: ***Project management.***

1. Describe project related documentation.
2. Create job summaries.
3. Update customer, revise project if required.

SECTION THREE:..... CUSTOMER DRAWING SPECIFICATIONS .....40 HOURS
IN A CAD FORMAT (II)

A. Notes and Specifications

Competency: ***Interpret notes and specifications in complex engineering design drawings.***

1. Explain notes and specs relevant to the fabricator.

B. Reading Complex Drawings

Competency: ***Read and fully interpret the steel detail components of complex drawings.***

1. Visualize complex 3D structures from 2D drawings.
2. Determine frames and individual pieces to detail.
3. Read architectural and structural drawings.
4. Find any conflicts, errors, etc,. in engineering drawings.
5. Prepare RFI (Request For Information) on errors and conflicts.

C. Understanding Other Structural Components

Competency: ***Describe the characteristics of non structural steel structures and building components.***

1. Describe block walls, composite floors, concrete drawings, joists and decking.

D. Reading Other Trade Drawings

Competency: ***Read and interpret drawings for non-structural building components.***

1. Examine mechanical and electrical drawings etc,. for conflicts with structural components.
2. Examine information from grating supplier, deck/cladding supplier, and precast for conflicts with structural components.
3. Resolve conflicts errors with engineer(s).

E. Create Erection Drawings

Competency: ***Create erection drawings.***

1. Create layouts using information from trade drawings and electronic information.
2. Apply proper sectioning, details, schedules, scaling, referencing and revisions in layouts.

SECTION FOUR: .....CREATING FABRICATION DRAWINGS IN A CAD FORMAT (II).....15 HOURS

A. Beam Detailing

Competency: ***Create complete detail drawings for beams.***

1. Detail beams, girders, first, and purlins.
2. Explain the effects of coping, vertical and horizontal bracing and moment connections.

B. Column Detailing

Competency: ***Create complete detail drawings for columns.***

1. Detail columns, both HSS and WF.
2. Add base plates, and shear keys, anchor bolts/holes, tie joist clips, cap plates, moment connections, column splices, and bracing requirements.

C. Bracing Detailing

Competency: ***Create complete detail drawings for bracing.***

1. Detail horizontal and vertical bracing using various shapes.
2. Add wind bracing gussets and field plates.

D. Miscellaneous Detailing

Competency: ***Create complete detail drawings for other steel components.***

1. Detail all types of handrails, ladders, stairs, roof openings doors, and sag rods.

SECTION FIVE:.....CSA W 178.2 LEVEL III WELDING INSPECTOR PREPARATION COURSE

This is the preparation course for becoming a CSA W 178.2 Level III welding Inspector. The students will have three level time periods to complete all 21 modules, if desired, but Module 1-4 and 7-11 are the only mandatory modules. For Level 3, the following modules may be completed, but are optional to this program.

Competency: ***Apply knowledge of weld inspection requirements to steel detail drawings.***

1. Module 17: Surface Inspection (Optional)
2. Module 18: Radiographic Inspection (Optional)
3. Module 19: Ultrasonic Inspection (Optional)
4. Module 20: Structure and Properties of Metals (Optional)
5. Module 16: Welding Metallurgy of Steels (Optional)

Note: The content covered in these Modules may be completed by an alternative method, if approved by the Occupational Committee.

ALBERTA STEEL DETAILER CERTIFICATE
LEVEL 3 PERIOD 1 PRACTICAL COMPETENCY

Note: Hours listed are the estimated time needed to teach these concepts. They are not intended as rigid guidelines.

SECTION ONE:.....SHOP FLOOR EXPERIENCE..... 80 HOURS

Competency: ***Apply shop based quality assurance concepts to the creation of drawings.***

1. Perform tasks appropriate for a Quality Assurance or Quality Control Agent. This should be in an introductory level fitting and/or welding inspection position. Student should gain tangible insight into the problems faced on the shop floor when working with drawings.

SECTION TWO: ..... FIELD EXPERIENCE ..... 40 - 80 HOURS

Competency: ***Apply field based quality assurance concepts to the creation of drawings.***

1. Perform tasks appropriate for a QA/QC or administrative assistant to allow the student tangible insight into the problems faced in the field when working with drawings.

SECTION THREE: .....ON THE JOB DRAFTING EXPERIENCE..... 1480 - 1520 HOURS

Competency: ***Perform employer assigned steel detail tasks.***

(Examples)

1. Apply the knowledge gained from Level 1, 2 and 3 curriculums in a detailing office.
2. Read complex, large drawing sets and specifications.
3. Appropriately complex drawing assignments, e.g. hips, valleys, horizontal bracings, etc,.
4. Look after transmittals RFIs, etc,.
5. Make bolt lists.
6. Customer, engineer communication, phone, fax email, etc,.
7. Prepare job documentations.
8. Maintain drawing register.
9. Work with junior staff teaching skills learned.
10. Apply advanced office skills, professional deportment.

ALBERTA STEEL DETAILER CERTIFICATE

LEVEL 3 PERIOD 2
PRACTICAL COMPETENCY

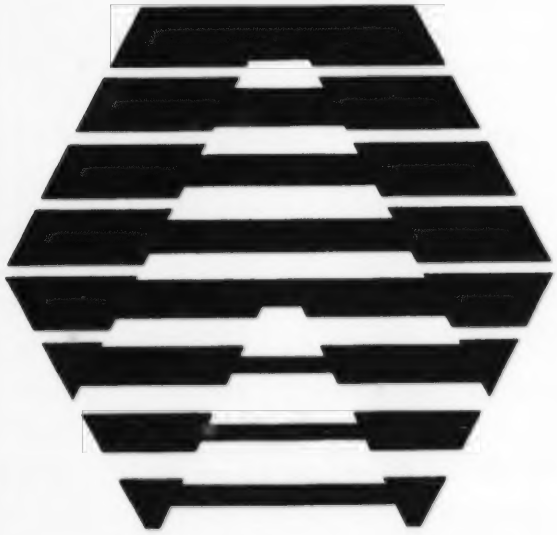
Note: Hours listed are the estimated time needed to teach these concepts. They are not intended as rigid guidelines.

SECTION ONE: ..... ON THE JOB DRAFTING EXPERIENCE ..... 1800 HOURS

Competency: ***Complete employer assignments.***

(Examples)

1. Apply the knowledge gained from Level 1, 2 and 3 in a detailing office.
2. Manage small jobs independently.
3. Work with 'junior' staff teaching skills learned.
4. Exhibit high levels of expertise and skill in work.



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